

SOLUTION

This problem asks you to prove that two sets are equal, so use [\(error|definition|SE\)](#). First show that $\infty \subseteq \langle \text{eigenspace} | A | \lambda \rangle \cap \langle \text{eigenspace} | A | \rho \rangle$. Choose $\langle \text{vect} | x \rangle \in \infty$. Then $\langle \text{vect} | x \rangle = \langle \text{zerovector} \rangle$. Eigenspaces are subspaces ([\(error|theorem|EMS\)](#)), so both $\langle \text{eigenspace} | A | \lambda \rangle$ and $\langle \text{eigenspace} | A | \rho \rangle$ contain the zero vector, and therefore $\langle \text{vect} | x \rangle \in \langle \text{eigenspace} | A | \lambda \rangle \cap \langle \text{eigenspace} | A | \rho \rangle$ ([\(error|definition|SI\)](#)). To show that $\langle \text{eigenspace} | A | \lambda \rangle \cap \langle \text{eigenspace} | A | \rho \rangle \subseteq \infty$, suppose that $\langle \text{vect} | x \rangle \in \langle \text{eigenspace} | A | \lambda \rangle \cap \langle \text{eigenspace} | A | \rho \rangle$. Then $\langle \text{vect} | x \rangle$ is an eigenvector of A for both λ and ρ ([\(error|definition|SI\)](#)) and so

$$\begin{aligned}
 \langle \text{error} | \text{compound vect} \rangle &= 1 \langle \text{vect} | x \rangle && \langle \text{error} | \text{compound acronymref} \rangle \\
 &= \frac{1}{\lambda - \rho} (\lambda - \rho) \langle \text{vect} | x \rangle && \lambda \neq \rho, \lambda - \rho \neq 0 \\
 &= \frac{1}{\lambda - \rho} (\lambda \langle \text{vect} | x \rangle - \rho \langle \text{vect} | x \rangle) && \langle \text{error} | \text{compound acronymref} \rangle \\
 &= \frac{1}{\lambda - \rho} (A \langle \text{vect} | x \rangle - A \langle \text{vect} | x \rangle) && \langle \text{vect} | x \rangle \text{ eigenvector of } A \text{ for } \lambda, \rho \\
 &= \frac{1}{\lambda - \rho} (\langle \text{zerovector} \rangle) \\
 &= \langle \text{zerovector} \rangle && \langle \text{error} | \text{compound acronymref} \rangle
 \end{aligned}$$

So $\langle \text{vect} | x \rangle = \langle \text{zerovector} \rangle$, and trivially, $\langle \text{vect} | x \rangle \in \infty$

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SOLUCION

Este problema le pide que muestre que las dos premisas son iguales, entonces use [\(error|definicion | SE\)](#). Primero muestre que $\infty \subseteq \langle \text{eigenespacio} | A | \lambda \rangle \cap \langle \text{eigenespacio} | A | \rho \rangle$. Escoja $\langle \text{vector} | x \rangle \in \infty$. Entonces $\langle \text{vector} | x \rangle = \langle \text{vectorcero} \rangle$. Eigenespacios son subespacios ([\(error|teorema | EMS\)](#)), entonces ambos $\langle \text{eigenespacio} | A | \lambda \rangle$ y $\langle \text{eigenespacio} | A | \rho \rangle$ contienen el vector cero, y ademas $\langle \text{vector} | x \rangle \in \langle \text{eigenespacio} | A | \lambda \rangle \cap \langle \text{eigenespacio} | A | \rho \rangle$ ([\(error|definicion | SI\)](#)). para mostrar que $\langle \text{eigenespacio} | A | \lambda \rangle \cap \langle \text{eigenespacio} | A | \rho \rangle \subseteq \infty$, suponga que $\langle \text{vector} | x \rangle \in \langle \text{eigenespacio} | A | \lambda \rangle \cap \langle \text{eigenespacio} | A | \rho \rangle$. Entonces $\langle \text{vector} | x \rangle$ es un eigenvector para A en ambas λ y ρ ([\(error|definicion|\)](#)) y entonces.

$$\begin{aligned}
 \langle \text{error} | \text{vector compuesto} \rangle &= 1 \langle \text{vector} | x \rangle && \langle \text{error} | \text{acronymref compuesto} \rangle \\
 &= \frac{1}{\lambda - \rho} (\lambda - \rho) \langle \text{vector} | x \rangle && \lambda \neq \rho, \lambda - \rho \neq 0 \\
 &= \frac{1}{\lambda - \rho} (\lambda \langle \text{vector} | x \rangle - \rho \langle \text{vector} | x \rangle) && \langle \text{error} | \text{acronymref compuesto} \rangle \\
 &= \frac{1}{\lambda - \rho} (A \langle \text{vector} | x \rangle - A \langle \text{vector} | x \rangle) && \langle \text{vector} | x \rangle \text{ eigenvector de } A \text{ para } \lambda, \rho \\
 &= \frac{1}{\lambda - \rho} (\langle \text{vectorcero} \rangle) \\
 &= \langle \text{vectorcero} \rangle && \langle \text{error} | \text{acronymref compuesto} \rangle
 \end{aligned}$$

Entonces $\langle \text{vect} | x \rangle = \langle \text{zerovector} \rangle$, y trivialmente, $\langle \text{vect} | x \rangle \in \infty$

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